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Sixth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction

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Item 6 of the agenda
Issues of substance and process for the period before the next Review Conference, with a view to reaching consensus on an intersessional process

Awareness-raising, education and outreach: recent developments

Submitted by Ukraine, Japan and the United Kingdom of Great Britain and Northern Ireland

I. Introduction

1. The rapid pace of scientific advancements in the life sciences, particularly recent developments in synthetic biology and gene editing, have brought about and promise significant benefits for society on a global scale. However, these considerable developments in life science capabilities also pose the possibility of misuse of peaceful research for nefarious purposes such as bioterrorism. Dual Use Research of Concern (DURC) has been discussed at length among various communities including BTWC States Parties, but it has yet to be agreed internationally how best to tackle the possibility of misuse, while not hindering beneficial scientific advancements.

2. One key factor that will help facilitate the responsible conduct of biological science is ensuring that biosecurity education and awareness is a key component of scientific training early on in the career progression of life scientists and those in other relevant disciplines. It is, however, not just the responsibility of scientists to ensure that life science research is not directed to misuse: in particular, policy makers, other government officials and industry all have a role to play. A relatively new group of stakeholders, the DIY-bio community, also has a responsibility in terms of both biosafety and biosecurity. This is a significant challenge and one that has been much debated in recent years. Scientists, unlike medical professionals, do not have to sign a declaration similar to the Hippocratic Oath in order to be considered competent. Nevertheless, they still have a social and moral responsibility to conduct peaceful and responsible scientific research. There is no globally accepted definition of what this entails, and many scientists do not have awareness or understanding of DURC and the BTWC; consequently, interpretation of 'responsible conduct' can — and does — vary.

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3. Previous Working Papers submitted to BTWC meetings have provided details of measures taken by States Parties nationally for oversight of life science research, educating scientists in biosecurity, raising awareness of the BTWC, and implementing codes of conduct to prevent the misuse of life science research[1]

4. This Working Paper takes forward many of the discussion topics identified previously, and presents some key examples from Ukraine and Japan on their approaches to awareness raising on the BTWC and DURC issues, and to providing biosecurity education to scientists. It builds upon and updates those examples of best practice presented in WP.10 submitted by Ukraine and the United Kingdom to the Eighth Review Conference[2]

II. Developing biosecurity education at university undergraduate level: some lessons from the experience of Ukraine.

5. The main effort in developing biosecurity education at university undergraduate level in Ukraine is the partner Project P633 "Education and Awareness-Raising in Ukraine", funded by the UK's Global Partnership programme in cooperation with the Science and Technology Center of Ukraine, which began in 2014. However, such activities had started in Ukraine in 2007, with the first international biosafety seminar in Kyiv, at which new information on biosafety, biosecurity, and bioethics was provided to university staff involved in teaching biosafety and biosecurity. The EU CBRN Centres of Excellence Project 19 "International Network of Universities and Institutes for Raising Awareness on Dual-Use Concerns in Biotechnology" and project 5327 "Biosecurity Education in Ukraine" included interviews on the status of biosafety and biosecurity education in Ukraine. By the time that Project P633 began, university teaching staff already had a high level of awareness of the relevant issues, as a result of their participation in seminars and conferences. However, while Ukrainian institutions almost always had courses that focused primarily on biosecurity and biosafety, there was no approved separate curriculum on biosafety, biosecurity, and bioethics. Thus, developing specific training materials and guidelines on biosafety, biosecurity and dual-use issues, and putting them into use, was identified as very important and was one of the main aims of Project P633.

6. A website was developed and, together with meetings, was used to make life scientists aware of project activities and to extend the existing network of stakeholders. Initially, the Project was aimed at life science universities. However, during project

[1] For example:

Oversight, education, awareness raising, and codes of conduct for preventing the misuse of bio-science and bio-technology. Working Paper submitted by Japan in consultation with Australia, Canada, Republic of Korea, Switzerland, Norway and New Zealand (BWC/MSP/2008/MX/WP.27).

Outreach and education in the life sciences: Case study in the U.S. Department of Energy National Laboratories. Working Paper submitted by the United States of America (BWC/MSP/2008/MX/WP.25).

Perspective on oversight, codes of conduct, education and awareness raising. Working paper submitted by Pakistan (BWC/MSP/2008/WP.5).

Possible approaches to education and awareness-raising among life scientists. Working Paper submitted by Australia, Canada, Japan, New Zealand, Republic of Korea and Switzerland (on behalf of "IACRSNNZ"), and Kenya, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America (BWC/CONF.VII/WP.26/Rev.1).

[2] Awareness-raising, education, outreach: An example of best practice. Working Paper submitted by Ukraine and the United Kingdom of Great Britain and Northern Ireland (BWC/CONF.VIII/WP.10).

implementation, technical universities with life sciences departments were also brought into the network. By the end of the project, 43 universities in 17 regions (oblasts) of Ukraine had participated in project activities, with a total of over 800 individual participants. The full list of the universities involved in the project is at Annex I.

7. As part of the project three international symposiums were held with over 100 participants, including international experts, representatives of Ukrainian governmental and research institutions, and representatives of 35 Ukrainian universities. Additionally, nine regional meetings were conducted, with over 500 participants, including representatives of governmental and research institutions, as well as over 200 representatives of universities and 300 students.

8. At the outset of the project, Ukraine lacked training materials for biosecurity teaching, and no comprehensive guide to biosecurity was available. The project provided the opportunity to translate into Ukrainian the best available training and reference documents on biosafety, biosecurity, and bioethics (the list of translated materials is at Annex II). All the translated documents are available on the project website www.biohazardcontrol.in.ua. They include the Guide 'Preventing Biological Threats: What You Can Do' and 'Biological Security Education Handbook: The Power of Team-Based Learning', which were produced by the University of Bradford, UK, and are freely available on line; these materials were the cornerstone for developing the teaching of biosecurity in Ukraine.

9. As part of project implementation an educational module on biosafety, biosecurity and bioethics was developed and trialled in three universities: Mechnikov Odessa National University, Dnipropetrovsk Medical Academy, and Vasilkovsk Chernivtsi National University. The universities participated very actively in the project, and used the education module as the basis for developing their own teaching programme on biosafety, biosecurity, and bioethics. The educational module was trialled using Team-Based Learning (TBL) – the first time that this teaching approach had been used in Ukraine. Both teachers and students emphasized the effectiveness of this method and its advantages: improving understanding, the opportunity to use knowledge in a practical way, and team work.

10. The various stakeholders took a close interest in the project, with Government representatives, including from the Ministry of Education and Science, Ministry of Health, Security Service of Ukraine, and Ministry of Defence, participating in project meetings; they emphasized the importance of awareness-raising on biosafety, biosecurity, and bioethics, and expressed their support for the project.

11. The materials developed during project implementation were adopted by universities which participated in the project. 25 universities have formally confirmed that they are incorporating the education module (fully or partially) into their own teaching programmes on biosafety, biosecurity, and bioethics.

12. Several universities had not taught biosecurity issues before the project started. The project provided these universities with the materials and methodological support they needed in order to include biosecurity in their curriculums. Some institutes incorporated biosafety, biosecurity, and bioethics issues into their curriculums for PhD students.

13. Initially, the project team aimed to promote the project, and the materials that had been developed as part of it, among the Government Ministries that were responsible for the curriculums of the life science universities, with a view to pressing for the incorporation of biosafety, biosecurity, and bioethics into the universities' curriculums. However, while the project was being implemented, the new Law on Education № 1556-VII (2014) was adopted, which made Ukrainian universities responsible for their own curriculums; the relevant Ministries can now only advise on this issue. Consequently, it became necessary to work with a large number of life sciences universities. This was the main challenge for the

project, and was overcome successfully. In addition, the Ministry of Education and Science, which supports teaching in the agrarian universities, approved the educational module and training materials, and recommended that these universities should use them.

14. Another major challenge for this project is to ensure that the outcomes achieved are sustainable. The website set up for the project will contribute to this, since it provides a mechanism for sharing the new reference documents and training materials, for participants to communicate through the website forum, and for announcing events of interest.

15. One of the possible tools for continuing awareness-raising efforts is the use of on-line techniques. This will make it possible to organize and conduct interactive teaching, communication, and conferences among the universities previously involved in the project, and with any future partners.

16. Efforts to raise awareness in relation to biosafety, biosecurity, and bioethics will continue in Ukraine beyond completion of the current project. To date, ten universities which participated in the project have proposed to continue collaboration in education and research efforts with the Palladin Institute of Biochemistry, and have signed the necessary agreements. Other universities are also very interested in such collaboration, and it is therefore possible that the number of agreements will grow. Further efforts will be needed to engage with universities moved from territories temporarily not under control of the Government of Ukraine.

17. Successful implementation of the project was not possible without strong support from, and collaboration with, foreign colleagues, who kindly provided the Ukrainian project team with the necessary training materials and shared best practices in teaching biosafety and biosecurity. International collaboration and communication in this field is very important, and will continue to be a key aspect of future efforts.

III. The Experience of Japan

18. In the field of education and awareness-raising on biosafety, biosecurity and bioethics, several projects have been carried out in the past few years in order to raise the awareness of scientists in Japan, in both the public and private sectors.

- In 2013, the Science Council of Japan published a "Code of Conduct for Scientists (revised edition)" to raise awareness of scientists involved in possible dual-use research to prevent misuse or abuse of their research.
- In 2014, the Council published "Dual use research of concern regarding Pathogens Research" focusing more specifically on the prevention of misuse or abuse of research on viruses and toxins.
- Since 2016, a series of Biosecurity Seminars has been organized with the support of the Government. The seminars focus on raising awareness of various stakeholders and exchanging information. They also discussed the challenges facing the BTWC.
- The Ministry of Foreign Affairs of Japan has been raising awareness among scientists by sharing information at relevant meetings on microbiology.
- In 2017, lectures about "Biosecurity, dual use research fields of concern" and "Cutting-edge life science technology and our society" were provided in relevant governmental academic institutions (Distinguished Lecture Series on Information Security Infrastructure), as a part of an educational program for graduate course students.

- In October 2017, the 10th annual meeting of the Japanese Society for Cell Synthesis Research was held in Kyoto. One of the important sessions in that meeting was a biosecurity session co-sponsored by the Government entitled "A new era of artificial gene synthesis and biosecurity safety", in which recent advances in gene synthesis technology were discussed, along with DURC issues. A recent news item about the artificial production of the horsepox virus was also introduced, and provided the participants a basis for fruitful discussion.

IV. Conclusions and Recommendations for States Parties.

19. There are a number of key points that States Parties might draw from these experiences, taking into account what is most appropriate given their own national structures and organizations:

- The need to reach out and engage with stakeholders over a period, obtain their interest and support, and build networks; it is especially important to engage with staff who will deliver the teaching, and students who will study the materials, to ensure that learning will be effective.
- The need to develop appropriate teaching materials, adapting what is already available for their own national circumstances and developing complementary material where necessary.
- The benefits of international collaboration and shared experience and expertise.
- The benefits of using websites and on line techniques to facilitate communication and learning.
- The importance of continuing efforts to ensure sustainability.

Annex I

The universities involved in implementing the project 'Education and Awareness-Raising in Ukraine'

Universities with biological departments (11):

1. Oles Honchar Dnipro National University
2. National Taras Shevchenko University of Kyiv
3. Ivan Franko National University of Lviv
4. National University "Kyiv-Mohyla Academy"
5. Mechnikov Odesa National University
6. Sumy State University
7. Uzhhorod National University
8. Karazin Kharkiv National University
9. Kherson State University
10. Cherkasy Bohdan Khmelnytsky National University
11. Fedkovich Chernivtsi National University

Medical universities (14):

1. Bukovinian State Medical University
2. National Pirogov Memorial Medical University
3. Dnipropetrovs'k Medical Academy
4. Odessa National Medical University
5. Zaporozhye State Medical University
6. Ivano-Frankivsk National Medical University
7. Galyckyi Lviv National Medical University
8. Bogomolets National Medical University
9. National University of Pharmacy
10. Ivan Horbachevsky Ternopil State Medical University
11. Kharkiv Medical Academy of Postgraduate Education
12. Ukrainian Medical Stomatological Academy
13. Kharkiv National Medical University
14. Ukrainian Military Medical Academy

Agrarian and Veterinary Universities (8):

1. Lugansk National Agrarian University
2. Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies
3. National University of Life and Environmental Sciences of Ukraine

4. State Agrarian and engineering University in Podilya
5. Poltava state agrarian Academy
6. Sumy National Agrarian University
7. Kharkiv state zooveterinary academy
8. Odessa State Agrarian University

Other (10):

1. National Academy of Security Service of Ukraine
2. National Technical University "Kharkiv Polytechnic Institute"
3. National University of Food Technologies
4. Lviv Polytechnic National University
5. Odessa National Academy of Food Technologies
6. Ternopil Ivan Puluj National Technical University
7. Pavlo Tychyna Uman State Pedagogical University
8. Cherkasy Institute of Fire Safety Named after Chornobyl Heroes of National University of Civil Protection of Ukraine
9. National Forestry University of Ukraine
10. Cherkasy State Technological University

Annex II

The materials translated as part of project implementation

1. Bradford series — two issues
2. Biorisk management. Laboratory biosecurity guidance
3. Responsible life sciences research for global health security. A guidance document
4. Education and Ethics in the Life Sciences
5. Biosecurity — Freedom and Responsibility of Research
6. «National Series» Bradford Disarmament Research Centre Division of Peace Studies, University of Bradford, UK
7. Preventing Biological Threats: What You Can Do
8. Biological Security Education Handbook. The Power of Team-Based Learning